

What is claimed is

- 1 1. An image processing apparatus, comprising:
- 2 an acquisition unit for acquiring image data that
- 3 includes a plurality of pixels, each of which is set as a
- 4 target pixel to be judged;
- 5 an isolated pixel judgment unit for judging, based on
- 6 the image data, whether the target pixel is an isolated pixel
- 7 for a judgment of a halftone-dot area;
- 8 an isolated pixel counter for counting a number of
- 9 isolated pixels in a predetermined area; and
- 10 a halftone-dot area judgment unit for judging whether
- 11 the target pixel is in a halftone-dot area, by comparing the
- 12 count number of isolated pixels with a predetermined
- 13 threshold,
- 14 wherein the isolated pixel judgment unit includes:
- 15 a first judgment subunit for judging whether the target
- 16 pixel is an isolated pixel for a judgment of a halftone-dot
- 17 area whose dot size is within a first range; and
- 18 a second judgment subunit for judging whether the target
- 19 pixel is an isolated pixel for a judgment of a halftone-dot
- 20 area whose dot size is within a second range, and
- 21 the isolated pixel judgment unit judges that the target
- 22 pixel is an isolated pixel, when a judgment result of at least
- 23 one of the first judgment subunit and the second judgment
- 24 subunit is affirmative.

1 2. The image processing apparatus of Claim 1,
2 wherein a minimum of the second range is above a minimum
3 of the first range, and is or below a maximum of the first
4 range, and
5 a maximum of the second range is above the maximum of
6 the first range.

1 3. The image processing apparatus of Claim 1,
2 wherein the first judgment subunit judges whether the
3 target pixel is an isolated pixel, based on image data
4 corresponding to pixels positioned in a first area with respect
5 to the target pixel, and
6 the second judgment subunit judges whether the target
7 pixel is an isolated pixel, based on image data corresponding
8 to pixels positioned in a second area with respect to the
9 target pixel, the second area being larger than the first
10 area.

1 4. The image processing apparatus of Claim 1,
2 wherein the first judgment subunit includes an isolated
3 pixel detection filter with a first size, and
4 the second judgment subunit includes an isolated pixel
5 detection filter with a second size that is larger than the
6 first size.

1 5. The image processing apparatus of Claim 1, further
2 comprising
3 an image correction unit for correcting the image data
4 in accordance with a judgment result of the halftone-dot area
5 judgment unit.

1 6. The image processing apparatus of Claim 1,
2 wherein the isolated pixel judgment unit includes:
3 a white isolated pixel judgment subunit for comparing
4 the target pixel and pixels at predetermined positions, and
5 judging that the target pixel is an isolated pixel when
6 brightness of the target pixel is higher than brightness of
7 the pixels at predetermined positions; and
8 a black isolated pixel judgment subunit for comparing
9 the target pixel and pixels at predetermined positions, and
10 judging that the target pixel is an isolated pixel when
11 brightness of the target pixel is lower than brightness of
12 the pixels at predetermined positions.

1 7. An image forming apparatus, comprising:
2 an acquisition unit for acquiring image data that
3 includes a plurality of pixels, each of which is set as a
4 target pixel to be judged;
5 an isolated pixel judgment unit for judging, based on
6 the image data, whether the target pixel is an isolated pixel

7 for a judgment of a halftone-dot area;

8 an isolated pixel counter for counting a number of
9 isolated pixels in a predetermined area;

10 a halftone-dot area judgment unit for judging whether
11 the target pixel is in a halftone-dot area, by comparing the
12 count number of isolated pixels with a predetermined
13 threshold;

14 an image correction unit for correcting the image data
15 in accordance with a judgment result of the halftone-dot area
16 judgment unit; and

17 an image forming unit for forming an image, based on
18 the image data corrected by the image correction unit,
19 wherein the isolated pixel judgment unit includes:

20 a first judgment subunit for judging whether the target
21 pixel is an isolated pixel for a judgment of a halftone-dot
22 area whose dot size is within a first range;

23 a second judgment subunit for judging whether the target
24 pixel is an isolated pixel for a judgment of a halftone-dot
25 area whose dot size is within a second range, and

26 the isolated pixel judgment unit judges that the target
27 pixel is an isolated pixel, when a judgment result of at least
28 one of the first judgment subunit and the second judgment
29 subunit is affirmative.

1 8. An image processing method, comprising the steps of:

judging, based on input image data, whether a target pixel is an isolated pixel, by using a detection filter with a first size;

judging, based on the input image data, whether the target pixel is an isolated pixel, by using a detection filter with a second size that is larger than the first size;

judging that the target pixel is an isolated pixel, when the target pixel is judged to be an isolated pixels in at least one of aforementioned judgment steps;

counting a number of isolated pixels in a predetermined area; and

judging whether the target pixel is in a halftone-dot area, by comparing the count number of isolated pixels with a predetermined threshold.

9. An image processing apparatus, comprising:

an acquisition unit for acquiring image data that includes a plurality of pixels, each of which is set as a target pixel to be judged;

an isolated pixel judgment unit for judging, based on the image data, whether the target pixel is an isolated pixel for a judgment of a halftone-dot area;

a first isolated pixel counter for counting a number of isolated pixels in a first area;

a second isolated pixel counter for counting a number

11 of isolated pixels in a second area that is smaller than the
12 first area; and

13 a halftone-dot area judgment unit for

14 (a) judging whether the target pixel is in a halftone-dot
15 area by comparing the number of isolated pixels counted by
16 the second isolated pixel counter with a first threshold,
17 in a first case where the number of isolated pixels counted
18 by the first isolated pixel is within a predetermined range,
19 and

20 (b) judging whether the target pixel is in a halftone-dot
21 area by comparing the number of isolated pixels counted by
22 the first isolated pixel counter with a second threshold,
23 in a second case that is other than the first case.

1 10. The image processing apparatus of Claim 9, further
2 comprising

3 an image correction unit for correcting the image data
4 in accordance with a judgment result of the halftone-dot area
5 judgment unit.

1 11. The image processing apparatus of Claim 9,
2 wherein the isolated pixel judgment unit includes:
3 a white isolated pixel judgment subunit for comparing
4 the target pixel and pixels at predetermined positions, and
5 judging that the target pixel is an isolated pixel when

6 brightness of the target pixel is higher than brightness of
7 the pixels at predetermined positions; and
8 a black isolated pixel judgment subunit for comparing
9 the target pixel and pixels at predetermined positions, and
10 judging that the target pixel is an isolated pixel when
11 brightness of the target pixel is lower than brightness of
12 the pixels at predetermined positions.

1 12. An image forming apparatus, comprising:
2 an acquisition unit for acquiring image data that
3 includes a plurality of pixels, each of which is set as a
4 target pixel to be judged;
5 an isolated pixel judgment unit for judging, based on
6 the image data, whether the target pixel is an isolated pixel
7 for a judgment of a halftone-dot area;
8 a first isolated pixel counter for counting a number
9 of isolated pixels in a first area;
10 a second isolated pixel counter for counting a number
11 of isolated pixels in a second area that is smaller than the
12 first area;
13 a halftone-dot area judgment unit for
14 (a) judging whether the target pixel is in a halftone-dot
15 area by comparing the number of isolated pixels counted by
16 the second isolated pixel counter with a first threshold,
17 in a first case where the number of isolated pixels counted

18 by the first isolated pixel is within a predetermined range,
19 and

20 (b) judging whether the target pixel is in a halftone-dot
21 area by comparing the number of isolated pixels counted by
22 the first isolated pixel counter with a second threshold,
23 in a second case that is other than the first case;

24 an image correction unit for correcting the image data
25 in accordance with a judgment result of the halftone-dot area
26 judgment unit; and

27 an image forming unit for forming an image, based on
28 the image data corrected by the image correction unit.

1 13. An image processing method, comprising the steps
2 of:

3 judging, based on input image data, whether a target
4 pixel is an isolated pixel for a judgment of a halftone-dot
5 area;

6 counting a number of isolated pixels in a first area;

7 counting a number of isolated pixels in a second area
8 that is smaller than the first area; and

9 judging whether the target pixel is in a halftone-dot
10 area, (a) by comparing the number of isolated pixels counted
11 in the second isolated pixel count step with a first threshold,
12 in a first case where the number of isolated pixels counted
13 by the first isolated pixel is within a predetermined range,

14 and (b) by comparing the number of isolated pixels counted
15 in the first isolated pixel count step with a second threshold,
16 in a second case that is other than the first case.